

Large Optical Telescope Based on High Efficiency Thin Film Planar Diffractive Optics, Phase I

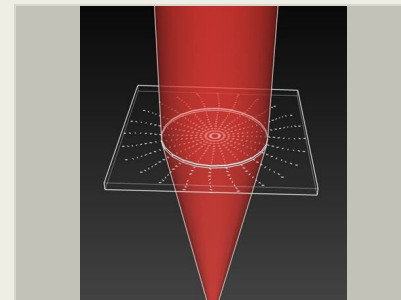
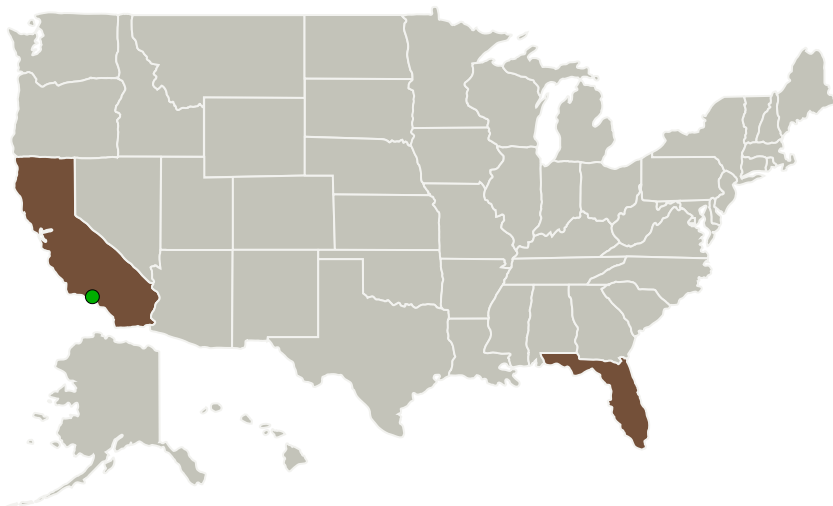
Completed Technology Project (2014 - 2014)



Project Introduction

In future ground-based receivers for deep-space optical communications with spacecraft, aperture diameters of the order of 10 meters are required even with the most sensitive available detectors. Directly applying the technology of 10 meter class ground-based telescopes is cost prohibitive. Also, conventional astronomical telescopes are not compatible with operation within 5 degrees of the sun, but such near-sun operation is required with the Ground-based Telescope Assembly to provide consistent and reliable wideband communications with interplanetary spacecraft. BEAM Co. proposes to develop a telescope based on diffractive optics that is expected to be far less expensive to manufacture than a telescope based on conventional reflective optics. Our approach takes advantage of the well-defined wavelength of the optical communications beam, thus allowing a high-efficiency design that is expected to be much lighter than a conventional design, thereby reducing the cost of the system that will be used to point the telescope. At the end of Phase I, we will have fabricated and tested subscale diffractive optical elements and performed tests to validate the technology's scalability to large apertures and its capability to support the <20 microradian object space spot size requirement as well as the requirement for near-sun operation.

Primary U.S. Work Locations and Key Partners



Large Optical Telescope Based on High Efficiency Thin Film Planar Diffractive Optics Project Image

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Organizations Performing Work	Role	Type	Location
BeamCo	Lead Organization	Industry Women-Owned Small Business (WOSB)	
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Florida
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Project Transitions

**June 2014:** Project Start**December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137502>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

BeamCo

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

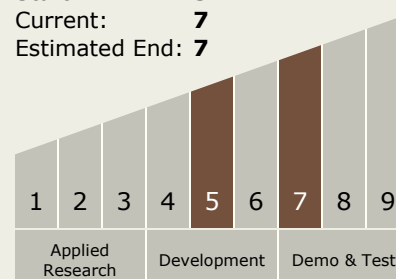
Carlos Torrez

Principal Investigator:

Nelson Tabirian

Technology Maturity (TRL)

Start: 5
Current: 7
Estimated End: 7

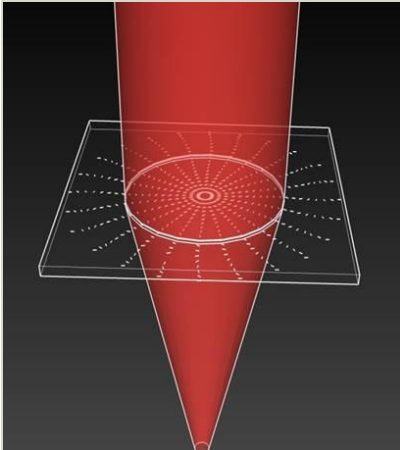


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Images



Project Image

Large Optical Telescope Based on High Efficiency Thin Film Planar Diffractive Optics Project Image (<https://techport.nasa.gov/image/134099>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.1 Optical Communications
 - └ TX05.1.2 Large Apertures

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System